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(54) A vibration-absorbing handle.

(57) The present invention comprises a vibration-absorbing handle (3) composed of two main parts: an outer sleeve (4) and an inner sleeve (5). The shape of the inner sleeve closely follows the contours of the tool for which it is intended. The outer surface of the inner sleeve (5) is substantially cylindrical and its inner surface consists of a material having a low coefficient of friction with respect to normal tool materials. The outer sleeve (4) consists of an elastomeric material and includes a number of radial protrusions, preferably axially running ribs (10, 11) which abut the outer surface of the inner sleeve (5) when the handle is fitted on the tool.

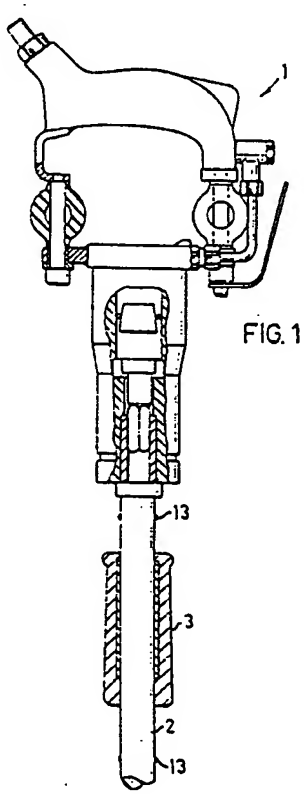

FIG. 1

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The invention relates to device for preventing or suppressing the transfer of vibrations from a tool, such as a chisel which can be gripped and controlled manually, the device consisting of a handle axially displaceable along the tool and comprising an inner sleeve shaped internally within the area of displacement to substantially follow the contours of the tool, the inner surface consisting of a material having relatively low coefficient of friction with respect to normal tool materials, and also an outer sleeve of elastomeric material surrounding the inner sleeve, said outer sleve to be gripped by the tool operator.

Vibrations from machines and tools are a serious ergonomic problem. Operators of hand-held vibrating tools are particularly affected and risk irreversible damage to the fine blood vessels in their arms and hands. This is an extremely frequent occupational injury in cleaning foundry products for which the operator uses a chisel hammer, holding and controlling the actual tool, i.e. the chisel, with one hand. Besides the pain and inconvenience experienced by the individual as a result of these injuries, they also incur considerable expense for the company in replacing workers. A handle of the type described in the introduction considerably reduces the risk of vibration injuries caused by this type of work since the handle greatly reduces the vibrations transferred to the hand holding the tool, the arm, shoulder and neck. However, the handle has its limitations and high vibration frequencies are only marginally absorbed by this known handle.

The object of the invention is to eliminate the deficiencies of the handle described above. This is achieved by the outer sleeve being composed of different elements forming substantially cylindrical zones having different degrees of flexibility in radial direction, an inner zone being in con tact with the inner sleeve and an outer zone being located radially outside the inner zone and having a lower degree of flexibility in radial direction than the inner zone.

One embodiment of the invention is described in more detail in the following with reference to the accompanying drawings in which

Figure I shows, partially in longitudinal section, a chisel hammer with a handle according to the invention arranged on the chisel,

Figure 2 shows a longitudinal section of a handle according to the invention,

Figure 3 shows a cross section along the line III -III in Figure 2,

Figure 4 shows a lateral view of an inner sleeve included in the handle shown in Figure 2,

Figure 5 shows the inner sleeve in Figure 4, seen from the front,

Figure 6 shows a modification of the inner sleeve shown in Figure 4, seen from the front,

Figure 7 shows a simplified view of a longitudinal section through an outer sleeve forming a part of the handle shown in Figure 1, and

Figure 8 shows a section along the line VIII - VIII in Figure 7.

In the embodiment shown in Figure 1 a vibration-absorbing handle 3 according to the invention is applied on a chisel 2 arranged in a chisel-hammer 1.

The handle 3 is composed of two main parts: an outer sleeve 4 and an inner sleeve 5. The outer sleeve 4 is made of elastomeric material having a softness degree of about 20 -45 shore, while the inner sleeve is made of material having a low coefficient of friction with respect to normal tool materials.

In the embodiment shown, see Figure 4 through Figure 6, the inner sleeve 5 consists of two halves 5a, 5b which are applied on the tool 2. The sleeve halves 5a, 5b are then joined by means of a snap-in joint 6 to form a sleeve surrounding the tool 2. The shape of the inner sleeve 5 closely follows the contours of the tool 2. The inner contour of the sleeve 5 may, for instance, be circular (Fig. 5), hexagonal or octagonal (Fig. 6), depending on the appearance of the tool 2. However, the external dimensions of the inner sleeve 5 are preferably the same, irrespective of its internal shape. This enables the same outer sleeve to be used for inner sleeves having different internal shape. The inner sleeve 5 also includes two axially running grooves 7.

The elastomeric outer sleeve 4 is provided with a substantially circular shoulder 8, 9 at each end. The distance between these shoulders 8, 9 corresponds to approximately the length of the inner sleeve 5. Ribs 10, 11 distributed uniformly around the circumference, extend between the two shoulders 8, 9 of the outer sleeve 4. Two ribs 11 located diametrically opposite each other are slightly larger than the other ribs 10, i.e. they protrude further in radial direction.

The outer sleeve 4 is passed over the inner sleeve 5 after the latter has been applied on the tool 2, with the inner sleeve 5 between the shoulders 8, 9 of the outer sleeve 4, thus positioning the inner sleeve 5 in axial direction with respect to the outer sleeve 4. At the same time it should be ensured that the larger ribs 11 fit into the axial grooves 7, thus locking the inner sleeve 5 against turning in the outer sleeve 4. When assembled, the ribs 10, 11 of the outer sleeve 4 abut the outer surface of the inner sleeve 5, air-filled gaps 12

being formed between the ribs 10, 11 and between the inner and outer sleeves. The distance between the shoulders 8, 9 on the outer sleeve is thus such that the air-gaps 12 are sealed thereby.

Since the solid portion of the outer sleeve 4 is spaced from the inne sleeve 5 by the ribs 10, 11 and the ribs have been given a cross-sectional area to ensure great flexibility, vibrations will be effectively absorbed, particularly high-frequency radial vibrations. This effect is even more noticeable when the air-gaps 12 are sealed at the ends since the air enclosed therein will also act as shock-absorber.

In the embodiment shown the outer sleeve 4 consists of a solid part with protrusions to form cylindrical radial zones with different flexibility. However, the invention also covers other designs. The protrusions shown in the drawings as straight, axial ribs may thus consist of helical ribs, studs or annular collars around the circumference, etc. To achieve cylindrical radial zones with different flexibility, thus giving the handle the desired spring and absorbing properties, the outer sleeve may also be composed of several layers of material having different degrees of hardness. In this case the outer layer should preferably be made of harder material than the outer layers.

In the embodiment shown in Figure 1 the path of movement of the vibration-absorbing handle 3 is limited by bosses 13 protruding radially from the chisel 2 on each side of the handle. The handle 3 is thus prevented from slipping off the tool when not in use. This limitation of movement can of course be achieved in other ways. Movement may be curtailed, for instance, by collars encircling or partially encircling the chisel 2. It may even be sufficient to arrange special devices to curtail movement in the form of bosses or collars along only one side of the chisel. The collars or bosses are produced by normal workshop methods, such as forging.

Claims

1. A device for preventing or suppressing the transfer of vibrations from a tool (2), such as a chisel which can be gripped and controlled manually, the device consisting of a handle (3) axially displaceable along the tool (2) and comprising an inner sleeve (5) shaped internally within the area of displacement to substantially follow the contours of the tool (2), the inner surface consisting of a material having relatively low coefficient of friction with respect to normal tool materials, and also an outer sleeve (4) of elastomeric material surrounding the inner sleeve (5), said outer sleeve (4) to be gripped by the tool operator, wherein the outer sleeve (4) is composed of different elements forming substantially cylindrical zones having different degrees of flexibility in radial direction, an inner zone being in contact with the inner sleeve (5) and an outer zone being located radially outside the inner zone and having a lower degree of flexibility in radial direction than the inner zone.

2. A device according to claim 1, wherein said inner zone is composed of a plurality of radial protrusions abutting the outer surface of the inner sleeve (5).

3. A device according to claim 2, wherein the protrusions comprise ribs (10, 11) running at least partially in the axial direction of the handle (3).

4. A device according to claim 3, wherein the ribs (10, 11) are straight and run parallel to the axial direction of the handle (3).

5. A device according to claim 3, wherein the ribs run helically.

6. A device according to claims 3 -5, wherein some of the ribs (11) engage in grooves (7) in the inner sleeve (5).

7. A device according to claims 1 -6, wherein the outer sleeve (4) is provided at each end with a shoulder (8, 9) directed radially inwards and fitting tightly against the inner sleeve (5), thus sealing any gap between the inner sleeve (5) and outer sleeve - (4) at the ends of the inner sleeve (5).

8. A device according to claims 1 -7, wherein the inner sleeve (5) consists of at least two sleeve sections (5a, 5b) joined together.

9. A device according to claim 8, wherein the sleeve sections (5a, 5b) are joined by a snap-in joint.

10. A tool such as a chisel or drill steel, on which a vibration-absorbing handle (3) is designed to be applied, the handle comprising an inner sleeve (5) of a low-friction material, shaped internally to closely follow the contours of the tool, and also an outer sleeve (4) of elastomeric material surrounding the inner sleeve (5), wherein the tool is provided with radially protruding stop means (13) limiting movement of the handle (3) along the tool.

11. A tool according to claim 10, wherein the stop means comprise two bosses arranged equidistant from the ends of the tool.

12. A tool according to claim 11, wherein the stop means comprise an annular collar circumventing the tool.

13. A tool according to claims 10 -12, wherein the stop means are arranged one on each side of the handle (3).

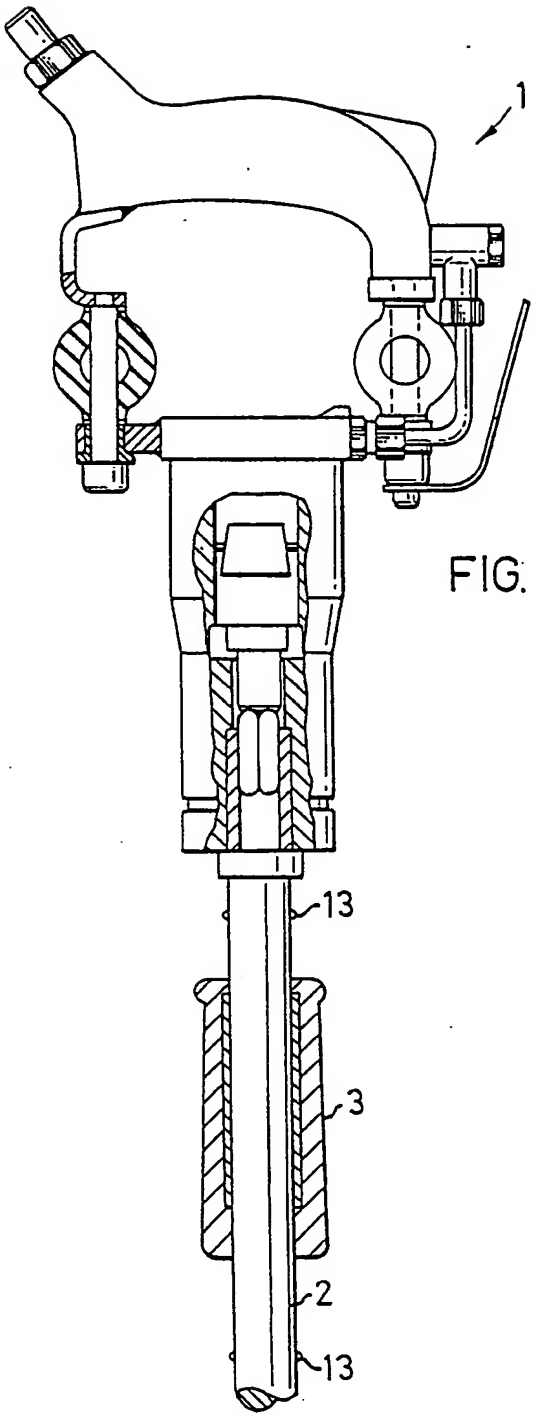

FIG. 1

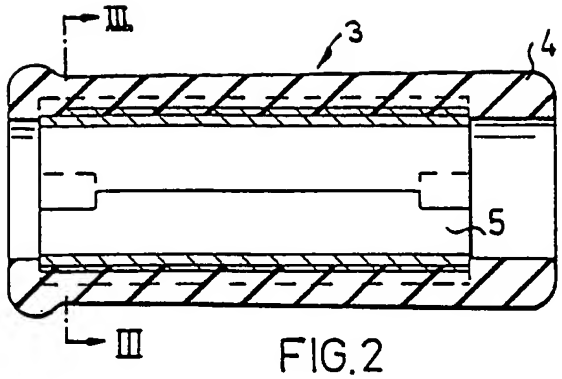

FIG.2

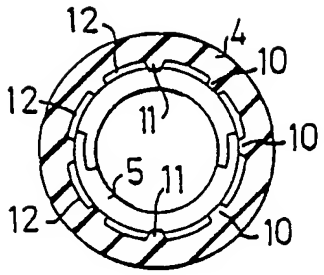

FIG.3

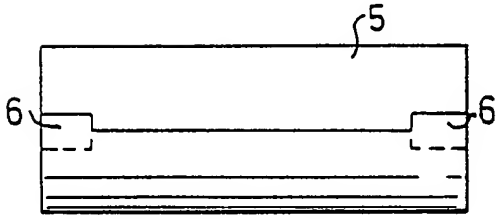

FIG.4

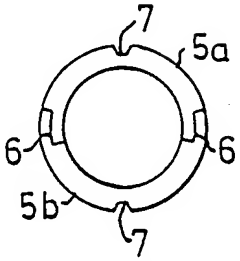

FIG.5

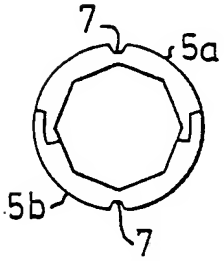

FIG.6

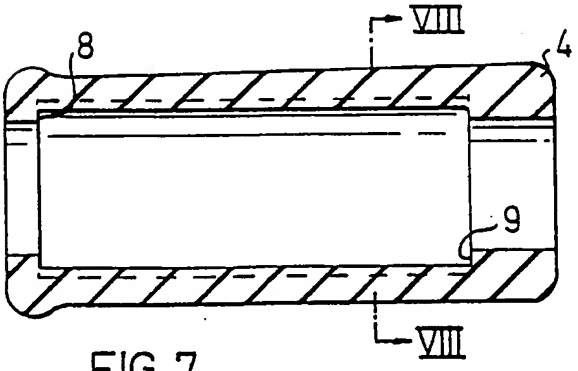

FIG.7

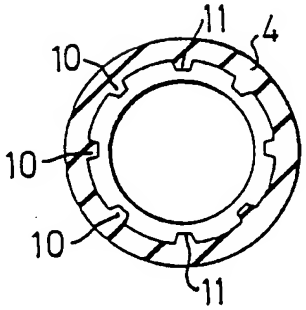

FIG.8

European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 86 85 0220

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
Y	US-E- 29 402 (SHOTWELL) * Whole document *	1-13	B 25 D 17/04 B 25 G 1/00 B 25 F 5/02
Y	US-A-3 344 684 (STEERE et al.) * Whole document *	1-13	
A	FR-A- 933 451 (PILAIN)		
A	GB-A-2 095 362 (HORI)		

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

B 25 D
B 25 F
B 62 B
B 62 K
B 25 G
E 21 C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	19-08-1986	BENZE W.E.

CATEGORY OF CITED DOCUMENTS

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